PART 1 GENERAL

1.1 SCOPE:

A. This work consists of establishing the JMF for HMAC for use in road and street constructions and/or repairs. Once established and accepted the JMF will be used to determine acceptance of the end product along with in-place testing.

1.2 DEFINITIONS:

A. HOT MIX ASPHALT CONCRETE (HMAC) - Asphalt concrete is a hot mixture of asphalt cement; well graded, high-quality aggregate; and mineral filler and additives as required; plant mixed into a uniformly coated mass, hot laid on a prepared base, and compacted.

B. RECYCLED ASPHALT PAVEMENT (RAP) - RAP is processed recycled asphalt pavement material used in the production of new asphalt concrete pavement. The RAP materials proposed for use in the recycled mix shall contain hard, sound, durable aggregates and asphalt cement.

C. JOB MIX FORMULA (JMF) – Mix design prepared by a certified, ODOT recognized lab, submitted to the Engineer by the Contractor for approval for use on contracted paving project.

PART 2 PRODUCTS

2.1 GENERAL:

A. The asphalt concrete mixture shall be a well-graded, uniform, durable mix of the class as shown on the Plans or approved by the Engineer. The components shall be within the broadband limits set forth in the following table unless modified by the job mix formula, see 2.8 Job Mix Formula.

TABLE A-1

Passing Sieve Size	Broadband Limits		
	Pct. Passing by Wt. Total Aggregate		
	Class B	**Class C**	**Class D**
1-inch	99-100	----	----
¾-inch	90-98	99-100	----
½-inch	75-91	90-100	99-100
¼-inch	50-70	52-80	85-100
No. 10	21-41	21-46	37-57
No. 40	8-24	8-25	13-29
No. 200*	2-7	3-8	4-9
Asphaltic Cement**	4-8	4-8	4-8

* Include lime or cement filler. When treatment of aggregate with lime is required, the percentage passing the No.200 sieve will be increased by 0.5 percent.

** Percent of total mix by weight. The amount of new asphalt cement to be added to the recycled mixture will vary from 3 to 8 percent.

2.2 ASPHALT CEMENT:

A. ASPHALT CEMENT - New asphalt cement shall be PBA-2 or PBA-5 and meet ODOT requirements pursuant to Section 02710 (latest revision).

B. ASPHALT CEMENT ADDITIVES - Anti-stripping additives ordered and/or approved by the Engineer shall be added to the asphalt cement and shall meet the requirements of the ODOT Standard Specifications.

2.3 AGGREGATES:

A. GENERAL.

1. Aggregates shall be hard, sound, durable, and free of deleterious substances.

2. The Contractor shall modify or adjust crushing and screening operations as necessary to produce materials meeting the specifications. During production of aggregates, samples of each size shall be provided as frequently as the Engineer considers necessary to determine conformance to the specifications.

3. The aggregate shall be stockpiled and removed from stockpiles in a manner that will minimize segregation.

B. FRACTURE OF GRAVEL.

1. A minimum of 75-percent of crushed gravel retained on the ¼-inch sieve shall have two fractured faces. A minimum of 75 percent of the material passing the ¼-inch sieve but retained on the No.10 sieve shall have one fractured face. All aggregate shall conform to ODOT TM 213.

C. SAND EQUIVALENT.

1. Sand equivalent shall be not less than 30 when tested in accordance with ODOT TM 101.

D. DURABILITY.

1. The material from which the aggregates are produced and the crushed aggregates shall meet the following test requirements

TABLE A-2			
TEST	**TEST METHOD**	**MAXIMUM VALUES**	
		Coarse Aggregates	**Fine Aggregates**
Soundness (5 cycles)	ODOT TM 206	12%	12%
Degradation Passing No.20	ODOT TM 208	30%	30%
Degradation Sediment Height	ODOT TM 208	3"	4"
Abrasion	ODOT TM 211	30%	--

E. DELETERIOUS SUBSTANCES

1. The aggregates shall be free from all other deleterious substances such as soft or disintegrated pieces, clay, loam, or vegetative matter, either in a free state or adherent to the aggregate.

2. The amount of deleterious substances in each test fraction of the crushed aggregate material shall not exceed the following values.

TABLE A-3		
TEST	**TEST METHOD**	**MAX. PERCENT (by wt.)**
Lightweight Pieces	ODOT TM 222	1.0
Wood Particles	ODOT TM 225	0.1
Friable Particles: Coarse Aggregate	ODOT TM 221	1.0
Friable Particles: Fine Aggregate	ODOT TM 221	2.5
Flat & Elongated Pieces: Coarse Aggregate	ODOT TM 229	5.0

F. COARSE AGGREGATE GRADING – STOCKPILE SEPERATED SIZES

1. That portion of the aggregate retained on a ¼-inch sieve with allowable undersize will be known as coarse aggregate and shall be crushed gravel.

2. The grading of the separated sizes of coarse aggregate shall conform to the following target values.

TABLE A-4						
SEPARATED SIZES – (Percentage by weight)						
Sieve Size Passing	**3/4" to 1/4"**		**3/4" to 1/4"**		**1/2" to 1/4"**	
	Target Value	**Tolerance +/-**	**Target Value**	**Tolerance +/-**	**Target Value**	**Tolerance +/-**
1-inch	100	0	100	0	--	--
¾-inch	90	5	75	7	100	-1
½-inch	60	8	8	8	95	5
¼-inch	8	8	7	7	8	8
No.10	5	5	5	5	5	5
No.40	3	2	3	3	3	3
No.200	1	1	1	1	1	1

G. FINE AGGREGATE GRADING – STOCKPILE SEPERATED SIZES

1. That portion of the aggregate passing the ¼-inch sieve with allowable oversize shall be known as fine aggregate and shall consist of finely crushed rock or finely crushed gravel and fine sand. No more than 15 percent by weight of natural uncrushed material passing the No.10 sieve shall be re-blended into the total fine aggregate

2. The grading of the fine aggregate shall conform as closely as possible to the following target values.

TABLE A-5						
Separate Sizes (Percentage of Weight)						
Sieve Size Passing	1/4" to 0"		1/4" to No.10		No.10 to 0"	
	Target Value	Tolerance +/-	Target Value	Tolerance +/-	Target Value	Tolerance +/-
3/8 inch	100	- 1	100	-1	--	--
1/4 inch	93	7	90	10	100	-1
No.10	--	--	10	7	90	10
No.40	--	--	5	5	37	8
No.200	--	--	2	2	12	4

2.4 RECYCLED AGGREGATES:

A. Recycled material used in the asphalt concrete pavement shall have a maximum size of 1-inch prior to entering the cold feed. Any recycled material larger than 1-inch shall be separated by screening or broken down by mechanical means to pass a 1-inch sieve and reincorporated with the balance of the recycled material to form a mixture acceptable to the Engineer

B. The recycled material shall be blended with new aggregate to provide a mix conforming to the job mix formula. If there is evidence that the recycled material is not breaking down during the heating and mixing of the asphalt concrete mixture, the Engineer may elect to modify the maximum size requirement. The fraction of recycled material in the new pavement shall not exceed 20-percent of the total aggregate by weight.

2.5 PORTLAND CEMENT AND HYDRATED LIME:

A. Portland cement filler shall meet the requirements of the ODOT Standard Specifications. Hydrated lime used as filler or used to treat aggregates shall meet the requirements of AASHTO M 216, Type 1, Grade A. The Contractor shall furnish manufacturer's certifications in conformance with submittal requirements of the Special Provisions.

2.6 MINERAL FILLER:

A. Mineral filler shall meet the requirements of AASHTO M17.

2.7 TEMPORARY SURFACING:

A. Asphalt concrete mixture for temporary surfacing, which is not to become a part of the final pavement, shall be a well-graded, uniform durable mix using all new materials or a combination of new materials and R.A.P. The allowable percentage of R.A.P. in the temporary surfacing shall be determined through an approved mix design.

B. The components of the mixture shall be within the broadband limits specified in Table A-1.

C. The mixture will be accepted on the basis of testing for each 200-tons of mixture or by other testing the Engineer deems necessary to ensure the mixture is appropriate for the intended use.

2.8 JOB MIX FORMULA:

A. The Contractor shall furnish a job mix formula for the approval of the Engineer or may propose the use of a current job mix formula on file with the Owner or with ODOT. A job mix formula will be required for each aggregate source.

B. If a job mix formula is not approved by the Engineer, then a new job mix formula will be established at the Contractor's expense.

2.9 TOLERANCES:

A. After the job mix formula is determined, the mixture shall conform to the formula within the following tolerances:

TABLE A-7		
Passing Sieve Size	**Leveling Course (+/-)**	**Base and Surface Course (+/-)**
1", ¾", ½"	Limits as indicated on Table A-1	
0.25"	7.0	6.0
No. 10	5.0	4.0
No. 40	5.0	4.0
No. 200	2.0	2.0
AC	0.60	0.50
Moisture Content	0.60	0.60

2.10 MODIFICATION OF MIXES:

A. The Engineer reserves the right to modify specified mixes for use under various traffic conditions on various segments of the work and for feathering, spot patching, and other special purposes. The Contractor shall provide mixes proportioned as directed the Engineer for such purposes.

B. Modifications of the mix as directed may require changes in the Contractor's plan and sequence of operations.

C. Upon written request from the Contractor, the Engineer may approve field adjustments to the job mix formula. Adjustments to the job mix formula may be made by the Engineer provided the change will produce material of equal or better quality. Any adjustments ordered by the Engineer, will be considered the job mix formula.

PART 3 EXECUTION

3.1 ASPHALT CONCRETE MIXING PLANT:

A. DEQ REQUIREMENTS MENTS – HMAC products shall be supplied from and produced at plants which comply fully with DEQ "Current air contaminate" limits under a current permit from DEQ. A copy of the permit shall be available to the Engineer at his request.

B. PLANT SCALES - Scales shall be accurate to 0.5-percent throughout the range of use and shall be tested and adjusted as often as directed by the Engineer to verify continued accuracy.

C. PLANT ACCESS – Mixing plant shall be accessible to inspection by the Engineer prior to or during production of the JMF. Plant process shall be of quality and quantity to ensure adequate mixing and delivery of the JMF as specified and is subject to the opinion of the Engineer.

3.2 DRYING AND SEPARATING AGGREGATES INTO DESIGNATED SIZES:

A. DRYING - Aggregates shall be dried to the extent that any retained moisture will not result in visible defects in the mixture such as slumping loads, boils, or slicks.

B. SCREENING - In plants which have screens, the aggregates shall be separated, immediately after drying and heating, by screening in to the sizes required for separate handling, storing and proportioning at the mix plant.

3.3 HEATING ASPHALT CEMENT:

A. Asphalt heating equipment shall be capable of uniformly heating the asphalt cement to the temperature specified and in accordance with the manufacturer's recommendations.

3.4 MIXING:

A. All the components of the asphalt concrete mixing plant shall be utilized and operated in a manner to ensure compliance with this section. The Combined materials shall be mixed until asphalt cement is distributed thoroughly in the mixture and the aggregate particles are completely and uniformly coated.

B. The moisture content of the mix shall not exceed 0.60-percent at time of discharge from the mixing plant.

C. The temperature of the mix at discharge from the plant shall not exceed 325^0 F.

3.5 MEASUREMENT AND PAYMENT:

A. HMA will be paid for at the unit price as accepted in the Proposal for the type of application and/or class of AC supplied per the specification section that applies.

3.6 SUBMITAL REQUIREMENTS:

A. Submit the following as a minimum;

1. Name, address and phone number of HMAC supplier

2. DEQ Air Quality Certification.

3. JMF, including the following;
   a. 5 point Marshall curves for
      Stability vs AC Content
      Flow vs AC Content
      Unit Weight of total mix vs AC Content
      Pct. Air Voids vs AC Content
      Pct. VMA vs AC Content
   b. Additives

4. Aggregate Source Qualifying Test, including the following;
   a. Sodium Sulfide Soundness
   b. Degradation
   c. Abrasion
   d. Fractures
   e. Sand Equivalent
   f. Deleterious Substances
   g. Percent Moisture Absorption of Aggregates
   h. Gradation Sieves

PART 4 TESTING

4.1 SAMPLING AND TESTING:

A. The Contractor shall make the plant available for inspection and sampling to ensure, to the satisfaction of the Engineer, that mix approved in the JMF can be adequately supplied.

END OF SECTION